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SCIENCE

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THE HALPINE TORPEDO-BOAT.

THE object in this invention is to provide a small vessel, if we may call it such, that can be steered electrically from the shore or from a war-vessel, and capable of carrying a torpedo that shall be thrown out on the boats touching any obstruction, such as a ship's side, and then discharged; the boat, however, first automatically backing away from the torpedo, so as to be at a safe distance when the explosion takes place.

The necessity for doing this by some small contrivance is that it

vented years ago. In this torpedo, motive and steering apparatus were provided, to be operated in various ways, but in the end to be controlled electrically from the starting station, whether on shore or shipboard. Some torpedoes of this design worked fairly well, but the explosion involved the destruction of apparatus costing thousands of dollars, so that practical experiments were few.

The Halpine torpedo-boat is a fish torpedo, which, after leaving its torpedo in any desired position, remains a fish, and runs away, so that when the explosion occurs it may be at a safe distance.

This plan is credited to Lieut. Nicholas J. Halpine of the United



THE HALPINE-SAVAGE TOPEDO-BOAT.

may be as inconspicuous as possible, and that it may furnish a small target for an enemy's guns. This last point is not of so much importance, however, since the modern machine-guns can pepper the surface of the water with shot to such an extent that no torpedo craft is likely to escape destruction if seen. These very machine-guns make the use of the so-called torpedo-boats extremely hazardous, and, some would have us believe, entirely unserviceable. Even at night the search-lights would detect their approach, when the guns would make quick work of them.

To avoid this difficulty of approach, the fish torpedo was in-

States Navy. But just as the plans of the lieutenant were about to materialize, he received orders to join the "Tallapoosa" in South American waters. It thus happened that the further carrying-out of the scheme devolved on Mr. Arthur W. Savage, the inventor of improved small arms. In some of the electrical work Mr. Savage was assisted by Mr. Frank A. Perret of Brooklyn, to whom we had occasion to refer not long since as the inventor of the Perret motor.

Our illustration shows the boat on shore. In the cigar-shaped hull are contained storage-batteries capable of driving the electric

motor attached to the propeller-shaft. A case containing the high explosive is carried in a chamber in the forward end. This chamber slopes downward, so that the torpedo, which has a rocket attachment at its rear end, will be thrown down and out on being released. It is also proposed to invert the boat when occasion may require, and provide means for throwing the torpedo from this chamber into the air, so that it may fall on a vessel's deck.

The position of the opening to this torpedo-chamber may be seen in the illustration, as the small chain connecting with the harpoon in front is attached to the torpedo. When the harpoon strikes a wooden bottom, it is expected to penetrate deeply enough to hold. When it passes through a torpedo-net, the harpoon-head will pass through the meshes till the cross-arms are reached, when a spring catch is released allowing other cross-arms to open inside the net, and nearer the harpoon-head. In any event, the harpoon is held. At the same time the torpedo is released, the rocket chamber in its rear end is ignited, and the torpedo discharged downward. The chain attachment to the harpoon-head then compels a swinging motion, so as to bring the torpedo up against the vessel's bottom.

While all this is going on, the automatic arrangements have reversed the boat, and carried it away from its dangerous position, so that the operator may then guide it safely back for use in another attack.

AMERICAN PUBLIC HEALTH ASSOCIATION.

On the second day, Wednesday, Oct. 23, Dr. John S. Billings of the United States Army read a paper on "The United States Census in its Relation to Sanitation." He emphasized the importance of the collection of vital statistics. Many do not regard this as so important as other work in behalf of public health. In order to convince the press and the community that the work of a board of health is necessary, you must produce constant, undeniable evidence; and this evidence must be mainly death-rates, to which should be added all the sickness-rates obtainable. To do this there must be a complete registration of deaths and births, and an enumeration of the whole population. Before this association meets again, the eleventh United States census will have been taken, and its methods and results are of great interest to all sanitarians. One of the most important questions to be settled before the census is taken is, "What shall be the boundaries of the special districts of the city for which a separate statement of the population is desired?" In some cities the wards form fairly satisfactory districts for the purpose, and where this is the case it makes the problem very easy. But in many cities these divisions bear no proper relation to different sanitary conditions: therefore in about a dozen of our large cities it is proposed to make a systematic division of the area into sanitary districts having special relations to altitude, character of habitations or of population, etc., and to have special death-rates calculated for each of these districts. This is being done in conference with the health authorities of these cities, and it is hoped that in this way some very interesting data will be obtained which will serve as a foundation for sanitary work in the future.

To make the statistics as correct and useful as possible, all deaths occurring in hospitals should be charged to the ward or district of the city from which the patient was taken to hospital, when this can be ascertained; otherwise the death-rate in the ward in which the hospital is located will be too high, and in the other districts it will be too low. The birthplace of the parents of the decedent should be also reported. Moreover, it is very desirable that in all cases of deaths of colored persons it should be stated whether the decedent was black or of mixed blood, such as mulatto or quadroon. One of the most important questions in the vital and social statistics of this country relates to the fertility, longevity, and liability to certain diseases, of those partly of negro and partly of white blood; and the only way to obtain data on this subject is through the registration of vital statistics. For all cities of ten thousand inhabitants and upward, it is proposed to collect as complete information as possible with regard to altitude, climate, water-supply, density of population, sewerage, proportion of sewered and non-sewered areas, and other points bearing on the healthfulness

of the place which will permit of interesting comparisons with the death-rates. The cordial co-operation of all physicians and sanitarians is solicited in making the data of these reports accurate and complete. It is desired to make these vital statistics an unanswerable argument in favor of systematic public sanitary work and of the granting of State and municipal funds necessary for maintaining such work.

In a paper by Dr. Ezra M. Hunt, secretary of the State Board of Health, Trenton, N.J., on "The Prevention of Phthisis Pulmonalis, and Methods for its Limitation," the author criticised those who regard the infection of phthisis pulmonalis as exclusively due to inhalation of the dried sputa of this disease. The theory was advocated that the breath of a consumptive patient is capable of carrying the contagion.

Dr. W. M. Smith, quarantine officer of the port of New York, read a paper on "Improvements at the New York Quarantine Station."

An excursion to the Quarantine and East River Hospitals, accompanied by Dr. Smith, took up most of the day.

At an evening session, Dr. George M. Sternberg, U.S.A., gave an account of recent researches relating to the etiology of yellow-fever. The investigations were made in Havana, between the middle of March and the first of September, 1889. Ample material has been obtained for a thorough research by modern culture methods. Thirty autopsies have been made in typical cases of yellow-fever. The cultures obtained require further study and extended comparative research before any definite conclusion can be reached as to the specific etiological relation of one or other of the micro-organisms found in yellow-fever cadavers, principally in the intestine. One method followed in the entire series of cases was the preservation of a piece of liver or kidney in an antiseptic wrapping, by which the exterior was sterilized and the entrance of germs from without prevented. Such a piece, after forty-eight hours in the laboratory, appeared fresh, and had no odor, but when cut was found to contain various micro-organisms. The cut surface had an acid re-action. The bacilli were of various species, and corresponding with those found in the contents of the intestine. No satisfactory evidence has been obtained, up to the present time, that any one of these is the veritable yellow-fever germ. One of the most constantly found of these micro-organisms was a large motionless, anærobic bacillus, resembling that of malignant œdema. This, and others found in a less number of cases, were present in small numbers at death, and in a large proportion of cases the result of an examination made immediately from fresh liver-tissue was negative. Material from a piece of liver, kept as above, and containing micro-organisms, is very pathogenic for guinea-pigs when injected subcutaneously in small quantities, while the fresh tissue may be injected in considerable amount without noticeable effect. The micrococcus of Freire has not been found in any cultures of this series, and the bacilli of Finlay and Gibier have not generally been found in the tissues of yellow-fever cadavers.

Dr. Theobald Smith of Washington read some preliminary observations on the micro-organism of Texas fever. Cultures have been made from the spleens of animals who died of Texas fever, and a variety of bacteria found. A variety of experiments led to the discovery of an organism within the red blood-corpuscles. The intraglobular bodies found are round or oval, and nearly colorless. There is usually one, but two or more may be found in one corpuscle.

This was followed by a paper by D. E. Salmon, D.V.M., chief of the Bureau of Animal Industry, Washington, entitled "Some General Observations on Texas Fever." The resemblance in the characteristics of yellow-fever in man and Texas fever in cattle was noticed. Each disease has a permanently infected and well-known district which is its home. The contagion of both diseases is carried, not by the sick, but by the healthy. Natives in the infected districts have a certain immunity from disease, while non-residents entering the locality will contract the fever. Both diseases, when carried north of their home, require a period of warm weather for development. Neither contagion survives a winter of snow and frost beyond its home. Both diseases are accompanied by an inflammation of the liver which causes yellow discoloration of the tissues, and in both hæmaturia is seen. These points of